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| 10/525,703  | 08/03/2005  | Heikki Ruotoistenmaki | 1016050-000084      | 4982             |
| 21839 7590 05/12/2009<br>BUCHANAN, INGERSOLL & ROONEY PC<br>POST OFFICE BOX 1404<br>ALEXANDRIA, VA 22313-1404 |             |                       |                     |                  |
| EXAMINER  |             |                       |                     |                  |
| STOUT, MICHAEL C  |             |                       |                     |                  |
| ART UNIT  |             | PAPER NUMBER          |                     |                  |
| 3736  |             |                       |                     |                  |
| NOTIFICATION DATE   |             | DELIVERY MODE         |                     |                  |
| 05/12/2009  |             | ELECTRONIC            |                     |                  |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ADIPFDD@bipc.com

### Office Action Summary

**Application No.**

10/525,703

**Applicant(s)**

RUOTOISTENMAKI, HEIKKI

**Examiner**

MICHAEL C. STOUT

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 February 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,4,6,7 and 9-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6,7,9-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/16/2008 has been entered.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

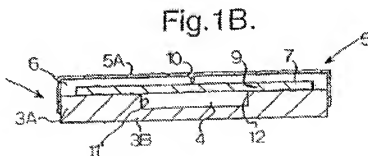
The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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Claims 1, 4, 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freakes et al. (WO 2002/31461 A1) in view of Bagdassarian et al. (US 4393321), Reuter (US 4974679) and Kusakabe et al. (EP0710827) and in view of Cullen et al. (US 4,422,055).

Freakes teaches a force or pressure sensor, comprising a substantially rigid, mechanical-load resistant frame (frame 3A), a flexible diaphragm secured over its peripheral rim to the frame (substrate 7), and a piezoelectric sensor diaphragm applied to the surface of the flexible diaphragm (SAWs device Y is laid down on the substrate, see Page 5, Paragraph 2) wherein the sensor diaphragm loading element comprises a substantially rigid cover capable of carrying mechanical loading (lid 5 which functions as a diaphragm and transmits a load via member 10 to substrate 7) wherein the cover includes a protrusion or shoulder (projection 10), bearing against a middle section of the flexible diaphragm and thus (see Figure 1B),



by deflection, prestressing the flexible diaphragm and the piezoelectric sensor diaphragm attached thereto (a recess 10 is formed in the lid and presses on the central region of the substrate, see Abstract and Page 5, Paragraph 4), and wherein the frame

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and the cover define therebetween a closed housing chamber (see Figure above), the flexible diaphragm and the piezoelectric sensor diaphragm being located there inside (see Figure 1B). Freakes in view of Reuter teaches the device wherein the frame, cover and the flexible diaphragm are rotationally symmetrical relative to the cover protrusion or shoulder (Freakes teaches a device wherein the frame, cover and flexible diaphragm are symmetrical about the cover protrusion, see Figure 1A). Freakes fails to teach the SAW diaphragm comprised of a piezoceramic material. Bagdassarian teaches a SAW device comprised of piezoceramic substrate, see Figure 1 and Column 4, Lines 35-45). Both Freakes and Bagdassarian teach SAW devices. Thus it would have been obvious to a person of ordinary skill in the art to modify the device taught by Freakes to include piezoceramic material as taught by Bagdassarian in the SAW diaphragm in order to provide a material to ensure acoustic wave propagation. Freakes teaches a cover which is capable of having a +50kg load placed on it. Nevertheless, Reuter teaches a load cell having a cover capable of carrying a mechanical loading of more than 50 kg (the button in Figure 1E is preferred for load cells with more than 50kg ratings, see Column 5, Lines 23-31). Both Freakes and Reuter teaches load sensing devices. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the device taught by Freakes by making the cover capable of carrying mechanical loading of more than 50kg as taught by Reuter in order for the device to operate in environments requiring at least a 50kg load to be detected thereby increasing the usability of the sensor, see Column 5, Lines 23-31. Freakes fails to teach the device comprising a sensor-signal transmitting conductor is in

contact with the sensor diaphragm opposite to the cover protrusion or shoulder. Kusakabe teaches a device wherein the sensing elements are connected to a circuit board via wires (conductor) located opposite a protrusion (8), see Figure 2 in order to detect a pressure and amplify a signal. Both Freakes and Kusakabe teach pressure sensor devices. Thus, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the device taught by Freakes to include wires connecting a circuit board and amplifier in the housing as taught by Kusakabe in order to provide a pressure detecting circuit connected to the diaphragm elements and provide a means for adjusting the gain of the circuit, see Kusakabe Column 7, Lines 35-50, and provide a pressure sensor suitable for detecting combustion pressure (abstract). Freakes fails to teach the device wherein the piezoelectric diaphragm is rotationally symmetrical about the center of the diaphragm. Cullen teaches a pressure transducer wherein the sensor diaphragm 29 and 39 are rotationally symmetrical about the center of the device, see Figure 1. It would have been obvious to a person of ordinary skill in the art to modify the device disclosed by Freakes by symmetrically placing the sensor diaphragm symmetrically about the center of the diaphragm by Cullen in order to increase the sensitivity of the device because a force delivered by the protrusion will be acting directly above the SAW element. Regarding claim 10, Freakes further teaches the sensor wherein the closed housing chamber is hermetically sealed (the lid and base material are preferably impermeable to gas and the seal between the lid and the base is also preferably impermeable to gas, see Freakes Page 5, Paragraph 1). Regarding claim 6, Kusakabe teaches a pressure sensor wherein an amplifier (121)

and a circuit board (20) are located in a housing chamber, see Figure 1 and Column 7, Lines 35-50, in order to provide a pressure detecting circuit connected to the diaphragm elements and provide a means for adjusting the gain of the circuit, see Kusakabe Column 7, Lines 35-50. Regarding claim 4, Freakes/Bagdassarian teaches the device wherein the piezoelectric ceramic sensor diaphragm comprised of a piezoceramic diaphragm (see Bagdassarian Figure 1 and Column 4, Lines 35-45), having a diameter smaller than that of the flexible diaphragm (See Freaks Figure 1A), and the piezoceramic sensor diaphragm has a peripheral rim at a distance from the inner periphery of the housing chamber (see Freaks Figures 1A and 1B shows the edge of the SAW diaphragm a distance from the inner periphery of the housing chamber).

Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freakes et al. (WO 2002/31461 A1) in view of Bagdassarian et al. (US 4393321), Reuter (US 4974679) and Kusakabe et al. (EP0710827) and Cullen et al. (US 4,422,055) as applied to claim 1 above, and further in view of Guscott et al. (US 4228379).

Regarding claim 3, Freakes teaches the device wherein the flexible diaphragm comprised of a substrate (7), having its peripheral rim secured between the edges of the frame and the cover (substrate may be secured to the base by means of an adhesive, see Freakes Page 5, Paragraph 3, Figure 1 shows the substrate is secured between the

edges of top of the frame and inside cover). Freakes fails to teach the device wherein the diaphragm is metal. Guscott teaches a transducer device comprising a metal diaphragm. Both Freakes/Reuter and Guscott teach transducer devices. Thus, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the device taught by Freakes/Reuter to include a metal diaphragm as taught by Guscott in order to employ a metal diaphragm which has improved immunity to environmental and aging conditions, see Guscott Column 2, Line 60 through Column 3, Line 8. Regarding claim 7 Freakes teaches the device wherein frame and cover are made of bodies. Freakes fails to teach the device wherein the frame and cover comprise elements in the shape of bodies of revolution. Guscott teaches a transducer device wherein the cover (28) and frame (22) and diaphragm (10) are rotationally symmetrical wherein the frame and cover comprise elements in the shape of bodies of revolution.



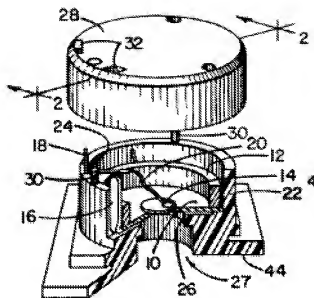


FIG. 1

Both Freakes/Reuter and Guscott teach transducer devices. Thus, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the device taught by Freakes/Reuter to include a rotationally symmetrical frame and cover comprised of bodies of revolution as taught by Guscott in order to provide a circular unit which can be incorporated into fluid pressure monitoring devices connected to circular tubes and because circular frames, covers and diaphragms, covers and frames are all old and well known in the art.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Freakes et al. (WO 2002/31461 A1) in view of Bagdassarian et al. (US 4393321), Reuter (US 4974679) and Kusakabe et al. (EP0710827) and in view of Cullen et al. (US 4,422,055); and Zhang (US 5,847,599).

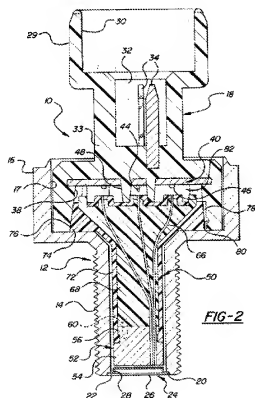
Regarding claim 9, Freakes/Kusakabe teaches the device wherein comprising an amplifier. Freakes/Kusakabe fails to teach the device wherein the amplifier has its input impedance matched to provide a desired settling time of the amplifier's output, during which the amplifier has its output set substantially to zero, while the loading applied to the cover respectively remains essentially unchanged. Zhang teaches an amplifier for a sensor wherein the amplifier has input impedances matched (the settling time (the response time for a amplifier to return to its zero state after a step response input) is a function of capacitances associated with the amplifier with alter the impedances of the respective input signals, see Column 4, Lines 6-19), to provide a desired settling time. Both Freakes/Kusakabe and Zhang teach amplifiers for sensor device. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to modify the device taught by Freaks/Kusakaba to include a matched impedance as taught by Zhang in order to provide a settling time sufficient enough to record rapid changes in the sensor output.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Freakes et al. (WO 2002/31461 A1) in view of Bagdassarian et al. (US 4393321), Reuter (US

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4974679) and Kusakabe et al. (EP0710827) and Cullen et al. (US 4,422,055) in view of Viduya (US 5706372)

Freake in view of Reuter teaches the sensor of claim 1 as set forth above, wherein the cover comprises the upper part of the housing of the device and is configured to measure fluid pressure. Freake fails to teach the sensor wherein the cover is provided with an adapter element which enables loading of the cover with changes in a fluid or gas pressure. Viduya teaches a device wherein the housing comprises an adapter element (threads 14) for fastening the sensor device to a cylinder to measure fluid pressure.



Both Freakes/Reuter and Viduya teach pressure sensor devices. Thus it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the device cover taught by Freakes/Reuter to include an adapter element as taught by Viduya in order to allow for the fastening of the device to a cylinder for measuring fluid, see Column 2, Lines 15-25).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

***Response to Arguments***

Applicant's arguments filed 12/16/2008 have been fully considered but they are not persuasive.

Regarding claim the Applicant argues that Freakes in view of Reuter fails to teach the limitation of the ridged cover capable of carrying mechanical loading of more than 50kg.

The Examiner disagrees. In response to applicant's argument that capable of carrying more than 50kg, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, and then it meets the claim. In the instant case the device disclosed by Freaks is capable of having a load greater than 50kg placed on the cover. Reuter teaches a pressure sensor having a cover capable of carrying loads greater than 50kg. Furthermore, it is well within the skill of one of ordinary skill in the art to modify the load capacity of the device by modify structure components of the housing for a given operating environment, the Examiner further notes that the applicant's disclosure fails to explicitly teach what permits applicants sensor to carry a load greater than 50kg.

In regards to the Applicant's argument that increased cover rigidly results in no dynamic signal output hence the device would be inoperable.

The Examiner disagrees. Reuter teaches a device with a cover capable of carrying a load greater than 50kg and being capable of detecting a pressure change,

also one could strengthen the sidewalls of the cover to support a load applied to the cover while leaving the horizontal surface thin enough to provide the desired flexibility. Furthermore, applicant's own invention has provides the combination of load capacity and ability to monitor a pressure change. The Applicant's arguments are merely conjecture that the device would be inoperable and fails to provide sufficient evidence that the increasing cover rigidity would result in the device being unable to detect pressure.

In regards to the Applicant's argument that Freaks fails to teach a "flexible diaphragm", the Examiner disagrees.

The load applied to the cover is transmitted though the cover protrusion to the diaphragm, the stress/strain (flexing) induced in the bendable (flexible) diaphragm 7 results in a measurable change in the SAWs device which correlates to a pressure measurement.

In regards to the Applicant's argument that one of ordinary skill in the art would not modify the wireless device of Freaks to be a wired device. The Examiner disagrees, it would be obvious to one of ordinary skill in the art at the time of the invention to modify a wireless device to be wired and visa versa. Both are old and well known means of connecting a sensor to processing means. This is further evidenced by Williston (US 2003/0216845 A1) which teaches monitoring vehicular tire pressure using wired or wireless sensors, see [0010].

In regards to the Applicant's argument that Freakes in view of Cullen fails to teach the flexible diaphragm being rotationally symmetrical. The Examiner disagrees.

Freaks teaches a device which is rotationally symmetrical about the cover protrusion, but shows the SAWs elements slightly offset from the center. Cullen teaches a SAWs sensors diaphragm wherein the SAWs element are rotationally symmetrical about the center of the diaphragm. The center of the diaphragm is the point where the applied load results in the largest deflection of the diaphragm and thus positioning the sensing elements to detect changes in the region of greatest deformation for a given load results in an increased sensitivity.

Regarding claim 3, the Applicant argues that there is no motivation to combine Freaks, Reuter and Guscott to provide a flexible diaphragm comprising a metal diaphragm. The Examiner disagrees. Guscott teaches a piezoelectric ceramic sensing element 14 comprising a metal diaphragm which has improved immunity to aging conditions.

#### ***Contact Info***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL C. STOUT whose telephone number is (571)270-5045. The examiner can normally be reached on M-F 7:30-5:00 Alternate (Fridays).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Max Hindenburg can be reached on 571-272-4726. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. C. S./  
Examiner, Art Unit 3736

/Max Hindenburg/  
Supervisory Patent Examiner, Art Unit 3736